| CONFIDENTIAL |

CIA No. 8073
9 April 1974

MEMORANDUM FOR: Mr. George Bennsky
Department of State

SUBJECT   : Further Analysis of Alternative
Plans for Sharing Oil in
Emergencies

1. In order to provide an analytical framework for
the discussion of the four current OECD oil sharing pro-
posals, we have prepared the three attached tables.
Table 1 shows the four plans with sharing implemented
after the countries participating in the plan have
absorbed a 15% cut in domestic consumption. Table 2
shows the same four after those participating have taken
a 10% cut in consumption. As can be seen from Table 1
and 2, a relatively severe crisis is required before the
sharing plans would go into effect. In the 15% case,
only an all Arab embargo of the US, Western Europe, and
Japan or an all Arab embargo of the United States alone
produces a crisis severe enough to trigger sharing in
1975. In the 10% case, a Libyan embargo of the US and
Western Europe would also trigger sharing. Table 3
provides several additional examples of oil shares under
the sharing plan with limits on cuts in consumption.

2. I have also included in the package the report
prepared by [   ] evaluating all seven of the
original OECD sharing plans. An evaluation of all seven
plans is still required because the plans which call for
a mixing of import sharing and consumption sharing require
an understanding of each of these two plans, even though
they are no longer in the running on their own.

3. We will continue to provide further analysis as
you may require.

25X1

25X1

Attachments:
as stated.

| CONFIDENTIAL |

CONFIDENTIAL

25X1

SUBJECT: Further Analysis of Alternative Plans for Sharing Oil in
Emergencies

DATE: 9 April 1974

S-PROJECT: S- 6678

25X1

Distribution:

Orig. & 1 - Addressee
1 - Charles Cooper (NSC)

25X1

EXPLANATIONS AND EVALUATIONS OF

ALTERNATIVE PLANS FOR SHARING OIL IN EMERGENCIES

Overview

Each of the seven plans[1]/ considered in 1973 by the
Informal Group on Sharing of the OECD Oil Committee could
affect oil prices and trade flows. The plans differ only
in how oil supplies are to be allocated during crises.
To the extent that any sharing plan succeeds, oil prices
during an emergency would not be increased by a scramble
for available supplies.

In comparing the plans against the alternative of no
agreement on sharing, we omit price effects and political
considerations, and focus only on differences in allocations
during emergencies. Table 1 provides a brief explanation
and evaluation of each plan. In subsequent sections and

25X1

Table 1

Summary Explanations and Evaluations of

Alternative Plans for Sharing Oil in Emergencies 1/

| Plan Name	Description	Advantages to the US	Disadvantages to the US
Vital Needs	A complex plan proposed by French delegates to the Informal Group.	Parameters of the plan could in principle be adjusted so that during virtually all crises we could import more oil with the agreement than without it. During certain crises, we could import more oil with the agreement than without it.	The parameters proposed by the French imply that their oil imports are much more important than ours. Under this assumption, the US would fare much better without an agreement to share. In some cases we might be required to forgo all oil imports. In most embargoes directed not just against the US, we could import more oil under no agreement to share.
Consumption-Based Sharing	During a crisis, each partner country takes an equal percentage cut in oil consumption.		
Consumption-Based Sharing, with Bonuses for Domestic Production	This plan is essentially undefined. The Group noted that in some cases it would be almost impossible to specify what the bonus would be, and who would get it.	Unknown.	Unknown.
Import-Based Sharing	During a crisis, each partner country takes an equal percentage cut in oil imports.	In all crises, this plan would allow us to import more oil than would consumption-based sharing. During the most likely embargoes, we would fare better under import-based sharing than under no agreement.	In relation to potential US cuts in oil consumption implied by import-based sharing, the corresponding cuts for Western Europe and Japan could well be so harsh that these nations would not adhere to the agreement.

25X1

25X1

Table 1 (continued)

Plan Name	Description	Advantages to the US	Disadvantages to the US
Arithmetic Compromise Between Import-Based Sharing and Consumption-Based Sharing	Import-based sharing implies one set of shares during a crisis, and consumption-based sharing implies another set of shares. An arithmetic compromise is simply a weighted average of the two alternative solutions.	To the extent that the import-based solution is weighted heavily, we would do well.	To the extent that the consumption-based solution is weighted heavily, we could import more oil under no agreement to share.
Combination of Import-Based Sharing, Essential Needs Sharing, and Consumption-Based Sharing	The pariticular combination suggested in the Group's report differs negligibly from consumption-based sharing.	If import-based sharing were weighted much more heavily in the combination, then the plan might be preferable to no agreement.	The combination suggested in the Group's report has essentially the disadvantages of consumption-based sharing.
Sharing on an Import Basis, but with a Limit on Differences in Percentage Cuts in Consumption	When the limit is zero, all partner countries take the same percentage cut in consumption, so in this case the plan reduces to consumption-based sharing. With a limit of 100 percentage points, the plan becomes import-based sharing. Between these extremes, the limit makes import-based sharing more acceptable to Western Europe and Japan.	Introduction of a limit on consumption cuts makes conceivable an import-based agreement with Western Europe and Japan.	If the limit is less than five percentage points, the agreement has the disadvantages of consumption-based sharing.

25X1

and tables, the plans are illustrated in detail with numerical examples. Finally, the effects of seven plans in different possible crises are presented.

Numerical Examples

25X1
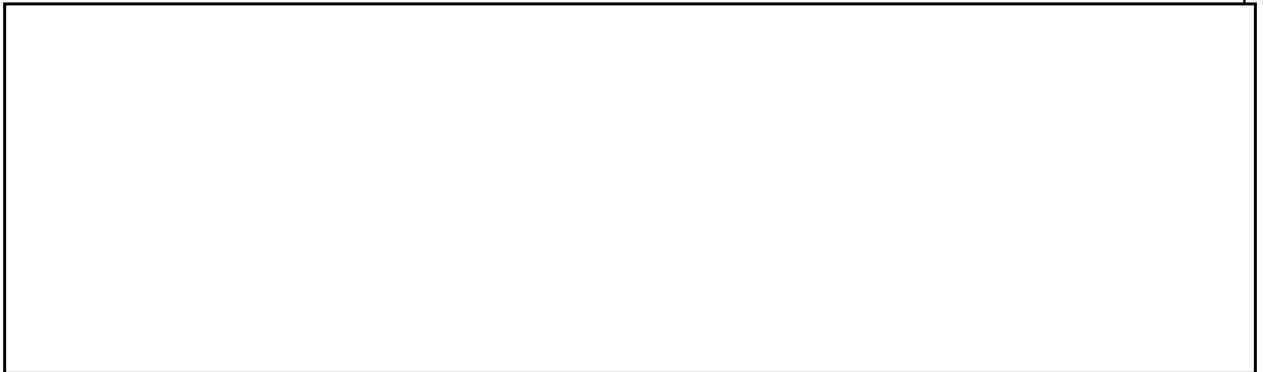
The Vital-Needs Plan

We illustrate this plan with three examples in table 2. In all cases the plan transforms an initial set of losses--shown in the first column of each table-- into a final solution shown in the last column of each table. The plan transforms the initial position differently depending on whether a crisis is severe, moderate, or mild. Example I illustrates a severe crisis defined as a case where priority needs exceed available supplies:

Table 2

Example I

Vital Needs Shares During an All-Arab Boycott of the US and Western Europe in 1975
(All quantities in millions of barrels per day unless otherwise stated)

	(1) Initial Loss	(2) Oil Consumption	(3) Priority Factors	(4) Priority Needs	(5) Oil Available	(6) Shares of Total Priority	(7) Distribution of Total Available Oil	(8) Loss After Distribution
United States	3.4	19.0	61.0%	11.6	15.6	39.7%	11.1	7.9
Western Europe	11.2	17.0	72.1%	12.2	5.8	41.7%	11.7	5.3
Japan	0.0	6.6	81.5%	5.4	6.6	18.5%	5.2	1.4
Total	14.6	42.6		29.2	28.0		28.0	14.6

Example II

Vital Needs Shares During an Iran/Iraq Cut-off of the US, Western Europe, and Japan in 1975

	(1) Initial Loss	(2) Oil Consumption	(3) Priority Factors	(4) Priority Needs	(5) Non-Priority Needs	(6) Priority Loss	(7) Excess Over Priority Needs	(8) Allocation of Loss	(9) Loss After Adjustment	(10) Loss Distributed by Non-Priority Needs	(11) Loss Aft Adjustme
United States	1.1	19.0	61.0%	11.6	7.4		6.3	1.1	2.2	3.92	3.06
Western Europe	3.5	17.0	72.1%	12.2	4.8		1.3	.2	3.7	2.54	3.12
Japan	2.5	6.6	81.5%	5.4	1.2	-1.3	0.0	-1.3	1.2	.64	.92
Total	7.1	42.6		29.2	13.4		7.6	0.0	7.1	7.10	7.10

25X1

Table 2 (continued)

Example III

All Arab Embargo of the US Alone in 1975
(All quantities in millions of barrels per day unless otherwise stated.)

	(1) Initial Loss	(2) Oil Consumption	(3) Priority Factors	(4) Priority Needs	(5) Non-Priority Needs	(6) Allocation of Loss by Non-Priority Needs	(7) Loss Adjustments		(8) Loss After Adjustment
United States	3.4	19.0	61.0%	11.6	7.4	1.9	1.7	.95	2.65
Western Europe	0.0	17.0	72.1%	12.2	4.8	1.2	0.0	.60	.60
Japan	0.0	6.6	81.5%	5.4	1.2	.3	0.0	.15	.15
Total	3.4	42.6		29.2	13.4	3.4	1.7	1.70	3.40

Example IIIa

All Arab Embargo of the US Alone in 1975

	(1) Initial Loss	(2) Oil Consumption	(3) Priority Factors	(4) Priority Needs	(5) Non-Priority Needs	(6) Allocation of Loss by Non-Priority Needs	(7) Loss Adjustments		(8) Loss Adjustment
United States	3.4	19.0	61.0%	11.6	7.4	1.9	2.89	.285	3.175
Western Europe	0.0	17.0	72.1%	12.2	4.8	1.2	0.00	.180	.180
Japan	0.0	6.6	81.5%	5.4	1.2	.3	0.00	.045	.045
Total	3.4	42.6		29.2	13.4	3.4	2.89	.510	3.400

25X1

-- columns (1) and (2) are initial losses and levels
of consumption;

-- column (3) lists priority factors suggested by
the French;

-- priority needs in column (4) come from
multiplying each item in (2) times the corresponding
priority factor in (3);

-- available oil supplies in column (5) are
(2) minus (1);

-- percentage shares of total priority in
column (6) are derived by dividing the total
of (4) into each element of (4);

-- the shares of total available oil in column
(7) are the total of (5) times the percentages
in (6); and

-- The final solutions in column (8) are derived
by subtracting the oil available in (7) from
the oil consumption figures in (2).

A moderate crisis occurs when enough oil is
available to meet total priority needs, but at least
one partner's initial loss exceeds his non-priority needs.
Computations in the moderate crisis illustrated by
Example II are:

-- priority needs in column (4) are derived by
   multiplying each priority factor in (3) by the
   corresponding level of consumption in (2);

-- non-priority needs in column (5) are (2)
   minus (4);

-- a priority loss in column (6) is any negative
   value obtained by subtracting (1) from (5);

-- excesses over priority needs in column (7)
   are positive values obtained by subtracting (1)
   from (5);

-- the total shortfall in priority needs, which
   is the sum of column (6), is allocated in (8)
   by dividing the total of (7) into each element
   of (7), and then multiplying the results by the
   priority loss--in this case Japan's loss--
   shown in (6);

-- the losses after adjustment in column (9)
   are (1) plus (8);

-- the losses are also distributed by priority needs
   in column (10), by dividing the total of (1)
   by the total of (5), and then by multiplying this
   result by each element in (5); and

-- the losses after adjustment in column (11)

 are one half the sum of (9) and (10).

Example III illustrates a mild crisis, in which each
partner's priority needs would be met under the pattern of
initial losses:

-- column (4) is (2) times (3);

-- column (5) is (2) minus (4);

-- column (6) is the total of (1) divided by the

 total of (5), multiplied by each element in (5);

-- the first loss adjustment column under (7) is

 .5 times (1), and the second loss-adjustment

 is .5 times (6), where the two values of .5 serve

 as weights for columns (6) and (7), and where

 another pair of weights such as .9 and .1 could

 be used; and

-- the loss after adjustment in column (8)

 is the sum of the adjustments in column (7).

Example IIIa shows how the solution in Example III
would change if in computing loss adjustments under
(7) we were to weight the initial solution in (1)
by a factor of .25, and the solution in (6) by a
factor of .15.

In summary, the outcome of the vital needs plan depends
on:

-- the initial pattern of losses;

-- the priority factors; and

-- the weights used in computing loss adjustment.

Consumption-Based Sharing and Import-Based Sharing

The next table illustrates two plans, namely
consumption-based sharing and import-based sharing.
Columns (1), (2), (3), (4), and (5) apply in both cases.

-- column (1) lists normal imports, and (2) lists
each bloc's share of total imports;

-- column (3) lists normal consumption, and (4)
. lists each bloc's share of total consumption;
and

-- column (5) lists the loss in imports that each
bloc experiences six months after the start of
the crisis.

Under consumption-based sharing, each partner takes
the same percentage cut in consumption:

--- the losses in consumption in column (9) are
derived by multiplying each percentage in (4)
times the total of (5); and

Table 3

Import-based Sharing and Consumption-based Sharing Under a Total Arab Embargo of the U.S. and a Five Percent Reduction Per Month in Arab Exports to Western Europe and Japan After 1 November 1973

(All quantities in millions of barrels per day unless otherwise stated.)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Normal Oil Flows					Import Sharing			Consumption Sharing		
	Imports	Percent of total Imports	Consumption	Percent of Total Consumption	Loss Per Day After 6 Months	Loss in Imports	Imports	Consumption	Loss in Consumption	Imports	Consumption
United States	6.5	23.7	17.5	45.1	1.8	1.7	4.8	15.8	3.3	3.2	14.2
Western Europe	15.3	55.8	15.7	40.1	4.2	4.1	11.2	11.6	3.0	12.3	12.7
Japan	5.6	20.4	5.6	14.4	1.3	1.5	4.1	4.1	1.0	4.6	4.6
Total					7.3	7.3			7.3		

25X1

--- the levels of consumption implied by the plan,
namely values in column (11), are derived by
subtracting (9) from (3).

Under import-based sharing, each partner takes an
equal percentage cut in imports:

-- the losses in column (6) are derived by
multiplying each percentage in (2) by the
total of (5);

-- the imports after sharing, in column (7),
result from subtracting (6) from (1); and

-- levels of consumption after sharing, in
column (8), are derived by subtracting (6)
from (3).

An Arithmetic Mixing of Oil Consumption
Sharing and Oil Import Sharing

During any crisis, import-based sharing dictates one
set of shares of available imports (as in column (7) of
table 3), and consumption-based sharing dictates another
set of shares of imports (as in column (10) of table 3).
To compromise between these two plans, we could weight
the import-based solution by 50%, and the consumption-
based solution by 50%. Mechanically, this would amount
to:

-- multiplying each import level in columns (7) and
   (10) of table 3 by .5, thereby getting two
   new columns, with the first number in each
   pertaining to the US, the second to Western
   Europe, etc.; and

-- adding the corresponding elements of each new
   column in order to get a third new column,
   namely the imports resulting from the 50/50
   compromise.

The weights need not be 50% and 50%. The import-
based shares could be weighted by 90% (e.g., by multiplying
.9 times each element in column (7) of table 3), and the

consumption-based shares could be weighted by 10%. Any pair of positive percentages that add to 100% could serve as weights.

A Combination of Import Sharing, Essential Needs Sharing, and Oil Consumption Sharing

This combined plan consists of three distinct options for sharing, namely sharing on the basis of imports, of consumption, and of vital needs. Each of the three is explained above in this annex.

To determine which of the three would apply in a particular crisis, we examine the loss each partner country would suffer under an agreement to share on the basis of imports.

By definition, a mild crisis obtains when under an import-based agreement each partner suffers less than a 10% cut in consumption. During a mild crisis, the combined plan reduces to import-based sharing. Table 4 illustrates this in a particular case:

-- column (1) shows initial losses;

-- columns (2) and (3) show pre-crisis levels of consumption and imports; and

Table 4

Sample Applications of a Combination of Import Sharing,
Essential Needs Sharing, and Oil Consumption Sharing
(All quantities are in millions of barrels per day unless stated otherwise.)

Example I--A Mild Crisis

	(1) Initial Losses	(2) Pre-crisis Consumption	(3) Pre-crisis Imports	(4) Percentages of Total Imports	(5) Percentages of Total Consumption	(6) Essential Needs	(7) Import-based Consumption Levels	(8) Consumption Levels During Crisis
United States	1.0	17.5	6.5	24		15.75	17.05	17.05
Western Europe	.5	15.7	15.3	56	Not	14.13	14.64	14.64
Japan	.4	5.6	5.6	20	Applicable	5.04	5.21	5.21

Example II--A Moderate Crisis

United States	1.8	17.5	6.5	24		15.75	16.60	15.63
Western Europe	1.1	15.7	15.3	56	Not	14.13	13.58	14.13
Japan	.9	5.6	5.6	20	Applicable	5.04	4.82	5.04
							34.92	35.00

Example III--A Severe Crisis

United States	1.8	17.5	Not	Not	45	15.75	15.8	14.2
Western Europe	4.2	15.7	Applicable	Applicable	41	14.13	11.6	12.7
Japan	1.3	5.6			14	5.04	4.1	4.6

25X1

-- percentages in column (4) are derived by
dividing the total of (3) into each element
of (3).

Given the information in columns (1) - (4), we
proceed to compute values for columns (6) and (7):

-- column (6) is derived by multiplying an
arbitrary factor, in this case .9, times each
element in (2), such that the results are
"essential needs" for each partner; and

-- column (7) is derived by multiplying each percentage
in (4) times the total of losses in (1), in
order to distribute the total loss over partners,
and then by subtracting the losses from
consumption levels in (2).

Since in the first example of table 4 each essential
need in column (6) is less than the corresponding
level of consumption in column (7), then the crisis is mild
and the final solution is sharing on the basis of imports,
as in column (8).

In the second example we proceed exactly as in the
first example in order to calculate essential needs in
column (6) and import-based consumption levels in
column (7). In this case, the essential needs of Western
Europe and Japan are not met under import-based sharing,
although the partners' total consumption exceeds their
total vital needs. Thus by definition the crisis is
moderate. In all moderate crises, the import-based
solution in column (7) is adjusted so that all partners'
essential needs are met, as in column (8).

In the third example we proceed as in the first
two to compute columns (6) and (7). In this case the
total essential needs exceed the total level of
consumption possible during the crisis, so the crisis
is termed severe. In all severe crisis, oil is allocated on
the basis of consumption, as shown in column (8).

Sharing on an Import Basis, but with
Limits on Cuts in Consumption

Under consumption-based sharing, all partners always
take equal percentage cuts in consumption, while under
import-based sharing the partners do not. To share on an
import basis, but to limit the disparity of percentage
cuts in consumption, we begin with three arrays of numbers,
namely the initial losses, the pre-crisis levels
of consumption, and the pre-crisis imports, as in columns
(1), (2), and (3) of table 5.

From these arrays we compute import-based consumption
levels and consumption-based consumption levels, as
explained above in this annex, and as illustrated in
columns (4) and (5) of table 5. We then multiply each
import-based level by .99, and each consumption-based
level by (1-.99), or .01. These multiplications yield
two sets of levels, namely the import-based levels weighted
by .99, and the consumption-based levels weighted by .01.
We add corresponding elements of the two sets to get a
single compromise solution. In this case, the compromise
is heavily biased toward the import-based solution.

Table 5

An Example of Sharing on an Import Basis, but with
Limits on Cuts in Consumption
(All quantities in millions of barrels per day unless otherwise stated.)

	(1) Losses Under No Sharing	(2) Pre-Crisis Consumption	(3) Pre-Crisis Imports	(4) Import-based Consumption Levels	(5) Consumption-based Consumption Levels	(6) Weighted Solution for Consumption Levels*	(7) Weighted Solution Consumption Level
United States	1.8	17.5	6.5	15.77	14.21	15.60	14.66
Western Europe	4.2	15.7	15.3	11.62	12.75	11.75	12.42
Japan	1.3	5.6	5.6	4.11	4.55	4.16	4.42

* No partner's percentage cut in consumption exceeds another's cut by more than 15 percentage points.

** No partner's percentage cut in consumption exceeds another's cut by more than five percentage points.

25X1

The compromise implies a set of percentage cuts in consumption, one for each partner country. There may be great disparities among the percentage cuts in consumption. If we want to insure that no partner's percentage cut in consumption exceeds another's by more than 15 percentage points, we calculate a new compromise. In this case the import-based solution is weighted by .98 rather than .99, and the consumption-based solution is weighted by .02 rather than .01. If the compromise obtained by adding the two weighted solutions satisfies the condition that no percentage cut should exceed another by more than 15 points, then the compromise is final.

If the 15-point condition is not satisfied, we again revise the weights, this time to values of .97 and .03. We then compute a new compromise based on these weights, and determine whether the new solution meets the 15-point condition. If so, the compromise is final; and if not, we choose new weights of .96 and .04. Again we compute a compromise and then test it against the 15-point limit. We continue this process until the limit is just satisfied (see the solution in column (6) of table 5).

The same procedure applies for any agreed limit on
the disparity of percentage cuts in consumption. The
smaller the allowable disparity, the closer to consumption-
based sharing will be the final solution (see column (7)
of table 5).